

Cryogenic Fluid Transfer Components Using Single Crystal Piezoelectric Actuators, Phase I

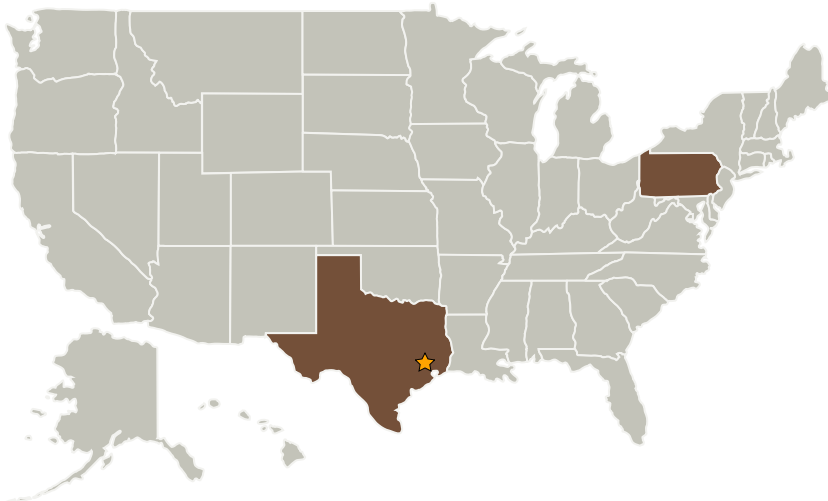
Completed Technology Project (2009 - 2009)



Project Introduction

Cryogenic fluid transfer components using single crystal piezoelectric actuators are proposed to enable low thermal mass, minimal heat leak, low power consumption and fast response for cryogenic fluid transfer and handling systems to support NASA Lunar Lander, Ground Operations, Ares, and Lunar Surface Systems programs. Single crystal piezoelectrics are attractive because they exhibit 3 to 5 times the strain as conventional piezoelectric ceramics, have very low strain hysteresis, and retain excellent piezoelectric performance at cryogenic temperatures. Low voltage, low profile, highly efficient single crystal piezoelectric actuators including stack actuators, unimorph/bimorph benders and flextensional actuators will be designed, fabricated and characterized at temperature of 20 K -300 K. A fluid valve incorporating single crystal actuators will be prototyped for flow control experiments.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
TRS Ceramics, Inc.	Supporting Organization	Industry	State College, Pennsylvania



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations

Pennsylvania

Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.1 In-space Propellant Storage & Utilization